Re-examining Whether, Why, and How Human-AI Interaction Is Uniquely Difficult to Design

Abstract

Artificial Intelligence (AI) plays an increasingly important role in improving HCI and user experience. Yet many challenges persist in designing and innovating valuable human-AI interactions. For example, AI systems can make unpredictable errors, and these errors damage UX and even lead to undesired societal impact. However, HCI routinely grapples with complex technologies and mitigates their unintended consequences. What makes AI different? What makes human-AI interaction appear particularly difficult to design? This paper investigates these questions. We synthesize prior research, our own design and research experience, and our observations when teaching human-AI interaction. We identify two sources of AI's distinctive design challenges: 1) uncertainty surrounding AI's capabilities, 2) AI's output complexity, spanning from simple to adaptive complex. We identify four levels of AI systems. On each level, designers encounter a different subset of the design challenges. We demonstrate how these findings reveal new insights for designers, researchers, and design tool makers in productively addressing the challenges of human-AI interaction going forward.